



Geospatial Technologies and Historic Canals Today: Enhancing Education, Recreation, and Tourism for End Users with GIS

John V. Ward, PhD

Associate Professor and Chair

Director of GIS

Department of Geography and Anthropology

College of Social Sciences and Professional Studies



Abstract

This presentation examines ways in which geospatial technologies (GIS) can be harnessed in order to help to manage historic canals and nearby sites of cultural and natural features and to provide information to end users related to education, recreation, and tourism.

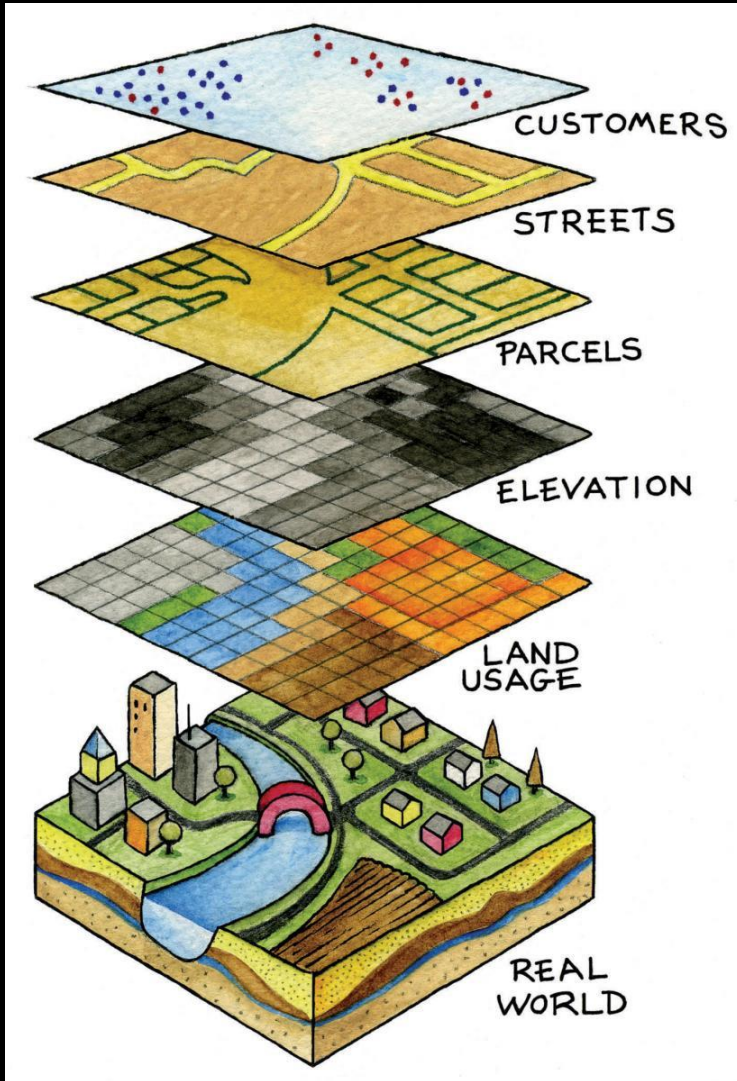
GIS Overview

Geographic Information Systems

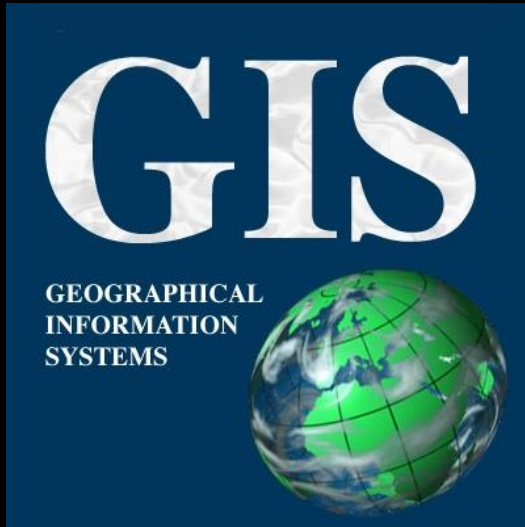
(aka Geospatial Information Systems)

Computer technology used to collect, store, manage, analyze, and visualize information with a spatial component (a location) utilizing a layer concept.

aka “computer mapping”



GIS is a Model of Reality



- A collection of representative spatial features
- A spatial model of the real world
- A simplified view of real world phenomena
- But today, it is so much more than a digital map

Components of GIS

A Geographic Information System (GIS) links locational (spatial) and database (tabular) information and enables a person to visualize patterns, relationships, and trends. This process gives an entirely new perspective to data analysis that cannot be seen in a table or list format. The five components of a GIS are listed below.

HARDWARE

The hardware is the computer and peripherals on which the GIS operates. Today, this could be a centralized computer server running the UNIX or Windows NT operating systems, a desktop PC, or an Apple Macintosh. The computer may operate in isolation or in a networked configuration.

- Computers
- Networks
- Peripheral Devices
 - Printers
 - Plotters
 - Digitizers



SOFTWARE

GIS software provides the functions and tools users need to store, analyze, and display geographical information. The key software components are:

- GIS Software
- Database Software
- OS Software
- Network Software



DATA

One of the most important components of GIS is the data. It is absolutely essential that data be accurate. The following are different data types:

- Vector Data
- Raster Data
- Image Data
- Attribute Data



GIS

PEOPLE

GIS technology is clearly of limited value without people to manage the system and to develop plans for applying it. Users of GIS range from highly qualified technical specialists to planners, business, and market analysts who use GIS to help with their everyday work.

- Administrators
- Managers
- GIS Technicians
- Application Experts
- End Users
- Consumers



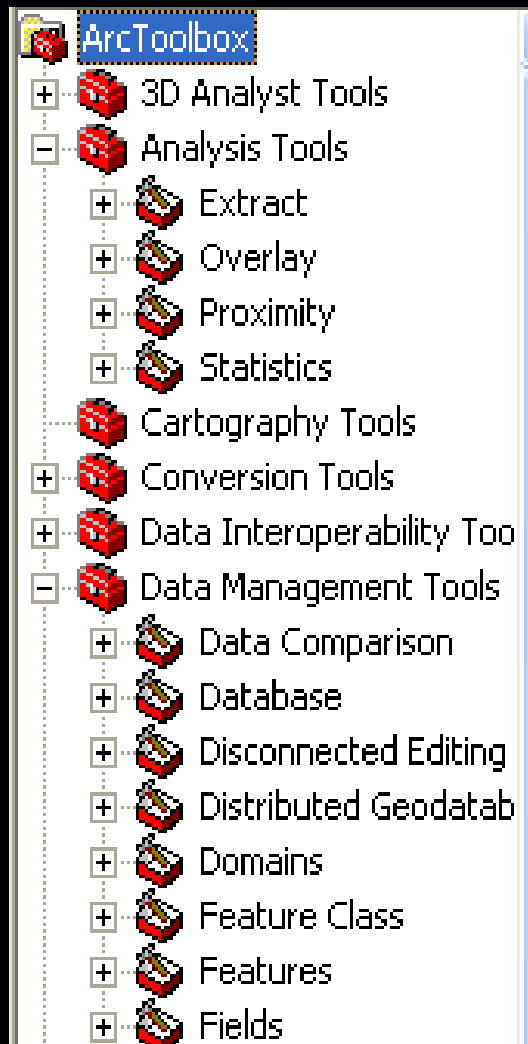
METHODS

Methods are well-designed plans and application-specific business rules describing how technology is applied. This includes the following:

- Guidelines
- Specifications
- Standards
- Procedures

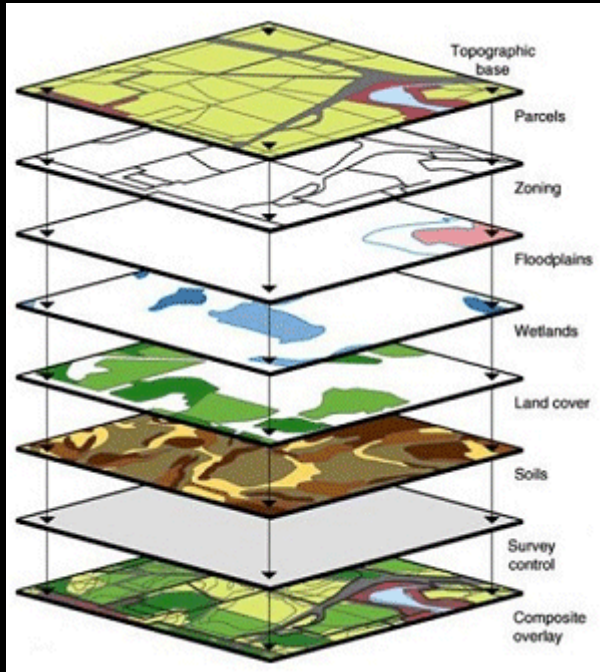


Common Functions of a GIS



- Data entry
- Data editing
- Data management
- Data sharing
- Data Analysis
- Data Output

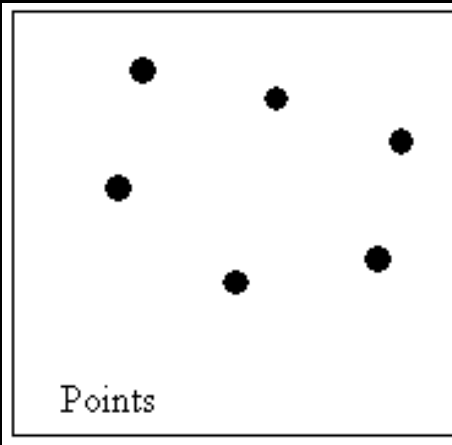
The GIS Layer Concept



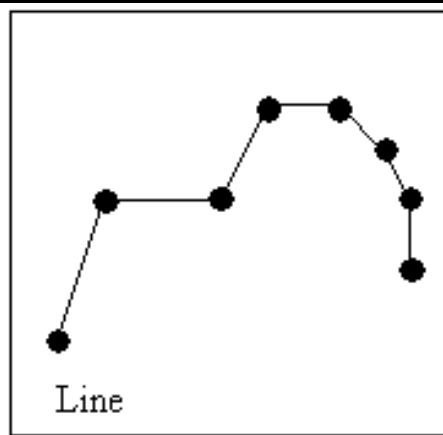
- Thematic layers
 - Organize spatial and attribute data for a set of cartographic objects, usually like features
 - Organized thematically and geometrically

Vector Data Model

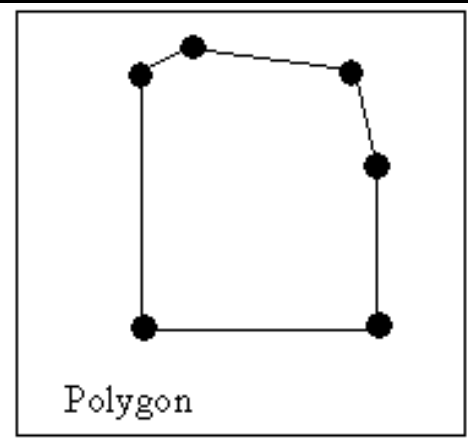
Points



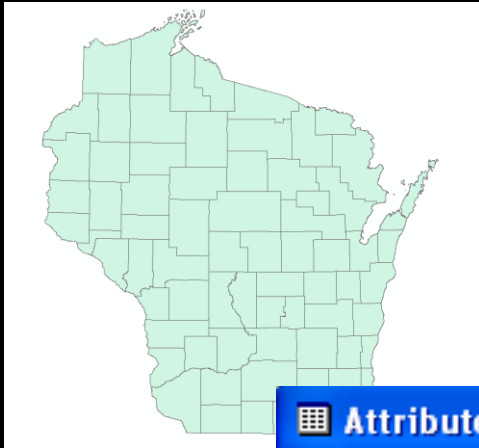
Lines



Polygons



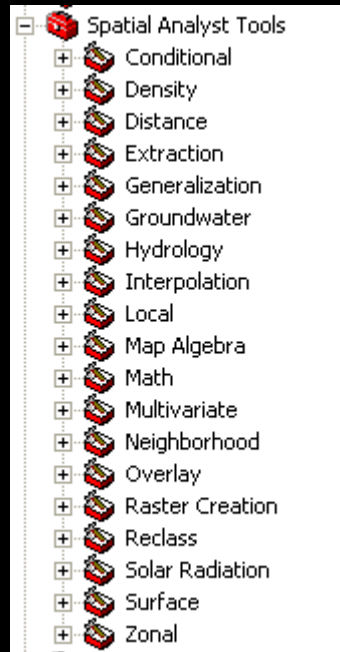
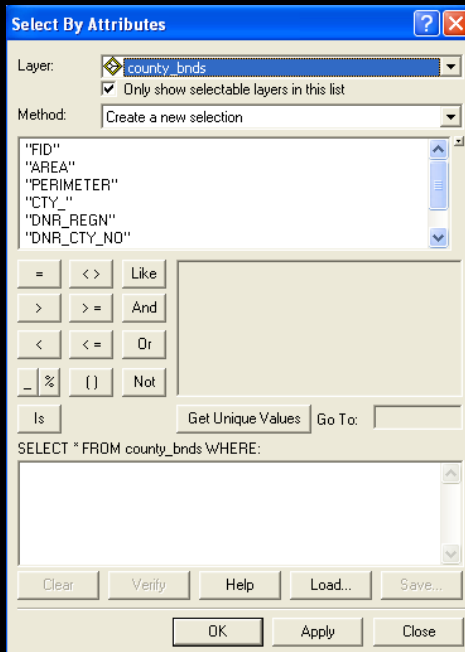
Cartographic Objects



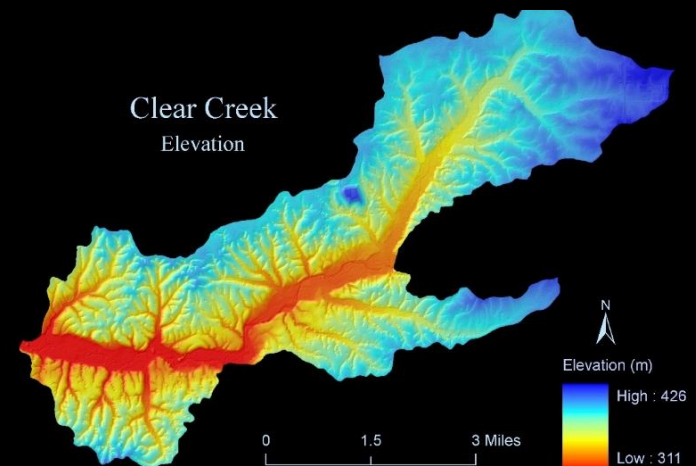
Attributes of county_bnds		
DIIR_REGII	DIIR_CTY_IIO	CTY_IAME
West Central	1	Adams
Northern	2	Ashland
Northern	3	Barron
Northern	4	Bayfield
Northeastern	5	Brown
West Central	6	Buffalo
Northern	7	Burnett
Northeastern	8	Calumet
West Central	9	Chippewa
West Central	10	Clark
South Central	11	Columbia
West Central	12	Crawford
South Central	13	Dane
South Central	14	Dodge
Northeastern	15	Door

- Features
- Attributes
- Values
 - Location
 - Shape
 - Non-spatial attributes
 - Metadata

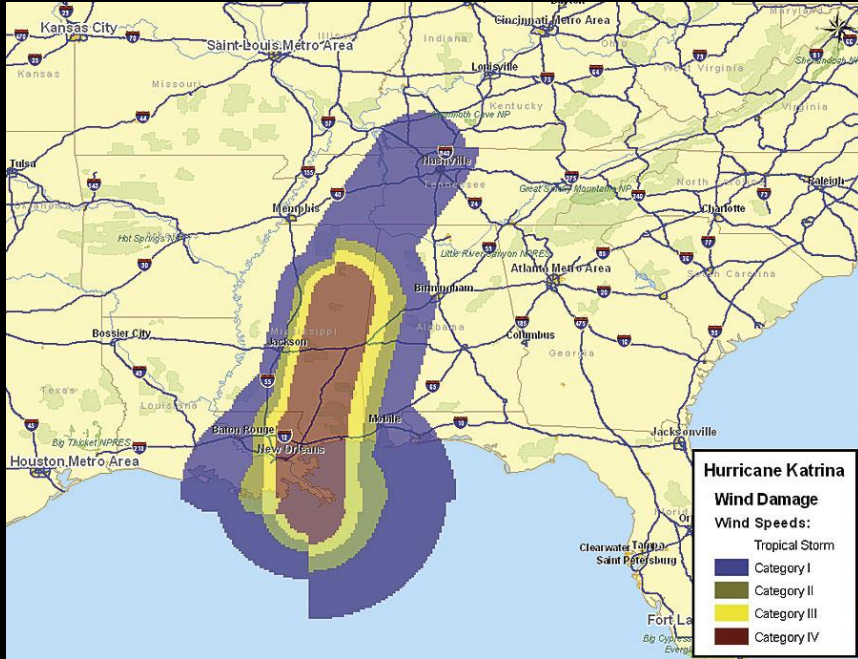
GIS Analysis



- Spatial query
- Attribute query
- Overlay
- Interpolation
- Buffering
- Map algebra
- Terrain analysis




Who Uses GIS?




- Government
- Natural and cultural resource managers
- Businesses
- Hazard responders
- Health care
- (Almost) everyone can

If you can map it, it's geography!

Field Mapping and Data Collection




Photo by
Caitlin Sievers
Courtesy of The Journal Times

Be at Parkside.

UNIVERSITY OF
WISCONSIN **PARKSIDE**

Photo by Caitlin Sievers, Racine Journal-Times

Why Am I Interested?

- Recreation

- I enjoy walking (both short and long distance)
- Hiking trails, rail trails, waterways, canals

- Tourism

- I enjoy exploring new places of historical and natural interest
- Places of interest and places of necessity (good and services)

- Education

- Enhances tourism and recreation
- Cultural history and natural history
- GIS serves as a great platform

C & O Canal



Photo: National Park Service, Department of the Interior, US Government

C & O Canal



John Wayne Pioneer (Rail) Trail (Milwaukee Road in Washington State)



Photo: Palouse to Cascades Trail Coalition

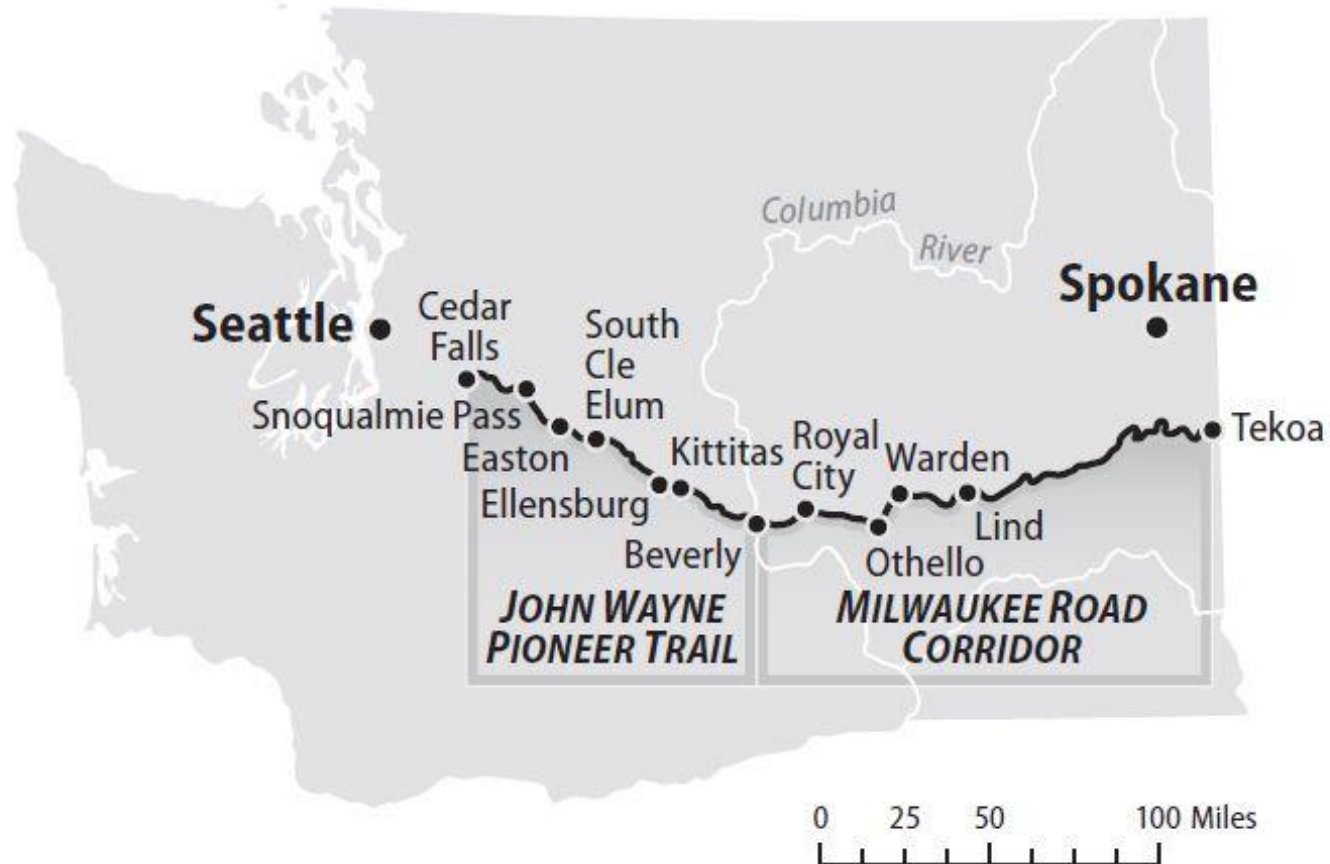


Figure 2.—The Pioneer Trail.

Ward, John V. 2013. The History and Geography of the Milwaukee Road in Eastern Washington. *Association of Pacific Coast Geographers Yearbook*, Vol. 75.

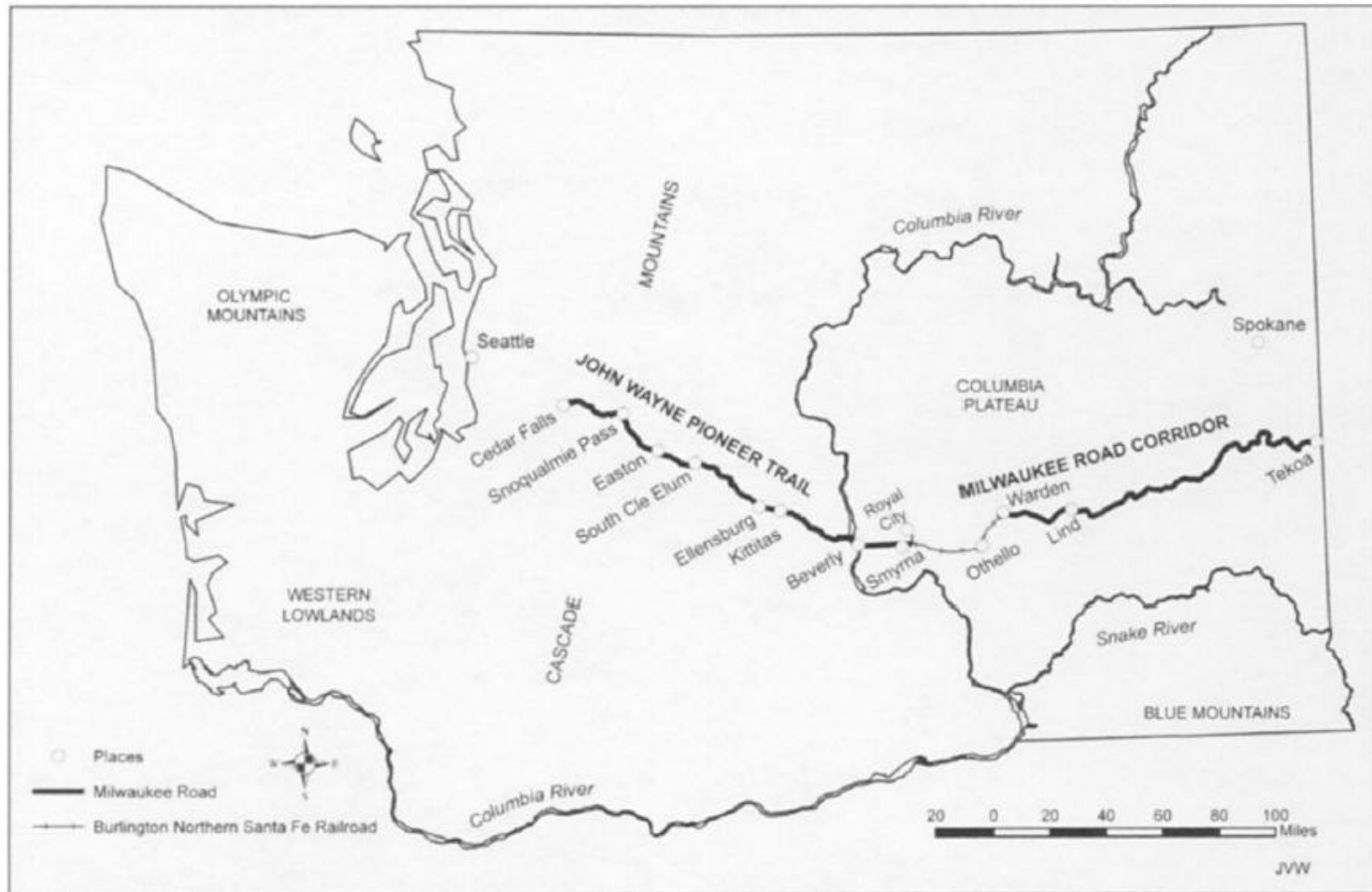


Figure 1. The John Wayne Pioneer Trail/Milwaukee Road Corridor in Washington State

Ward, John V. and Nancy B. Hultquist. 2010. The John Wayne Pioneer Trail in Washington State: Rails-to-Trails to... Rails and Trails? *Material Culture: The Journal of the Pioneer America Society*. 42 (1): 25-46

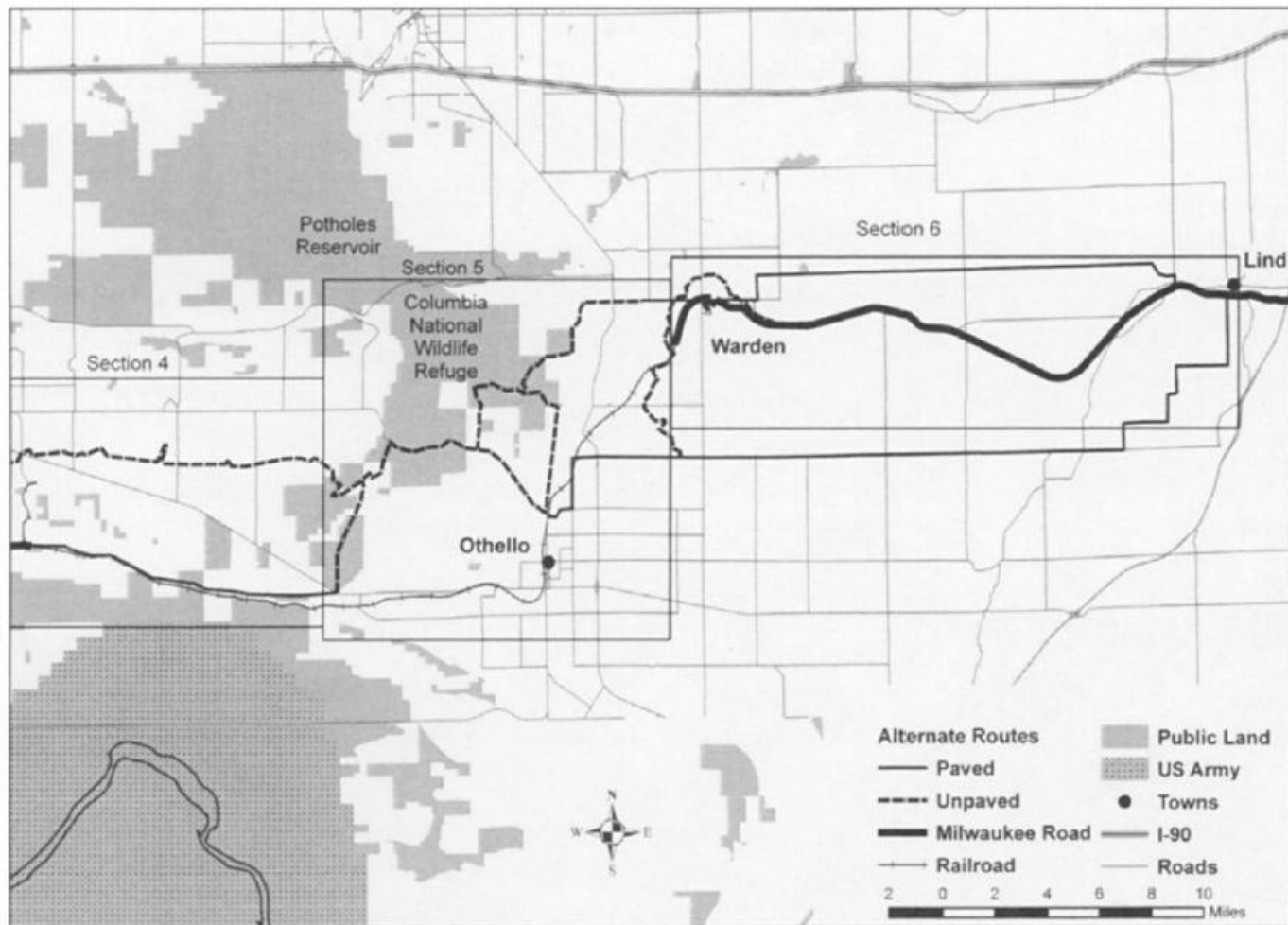


Figure 9. Alternate Routes – Eastern half of study area

Ward, John V. and Nancy B. Hultquist. 2010. The John Wayne Pioneer Trail in Washington State: Rails-to-Trails to... Rails and Trails? *Material Culture: The Journal of the Pioneer America Society*. 42 (1): 25-46

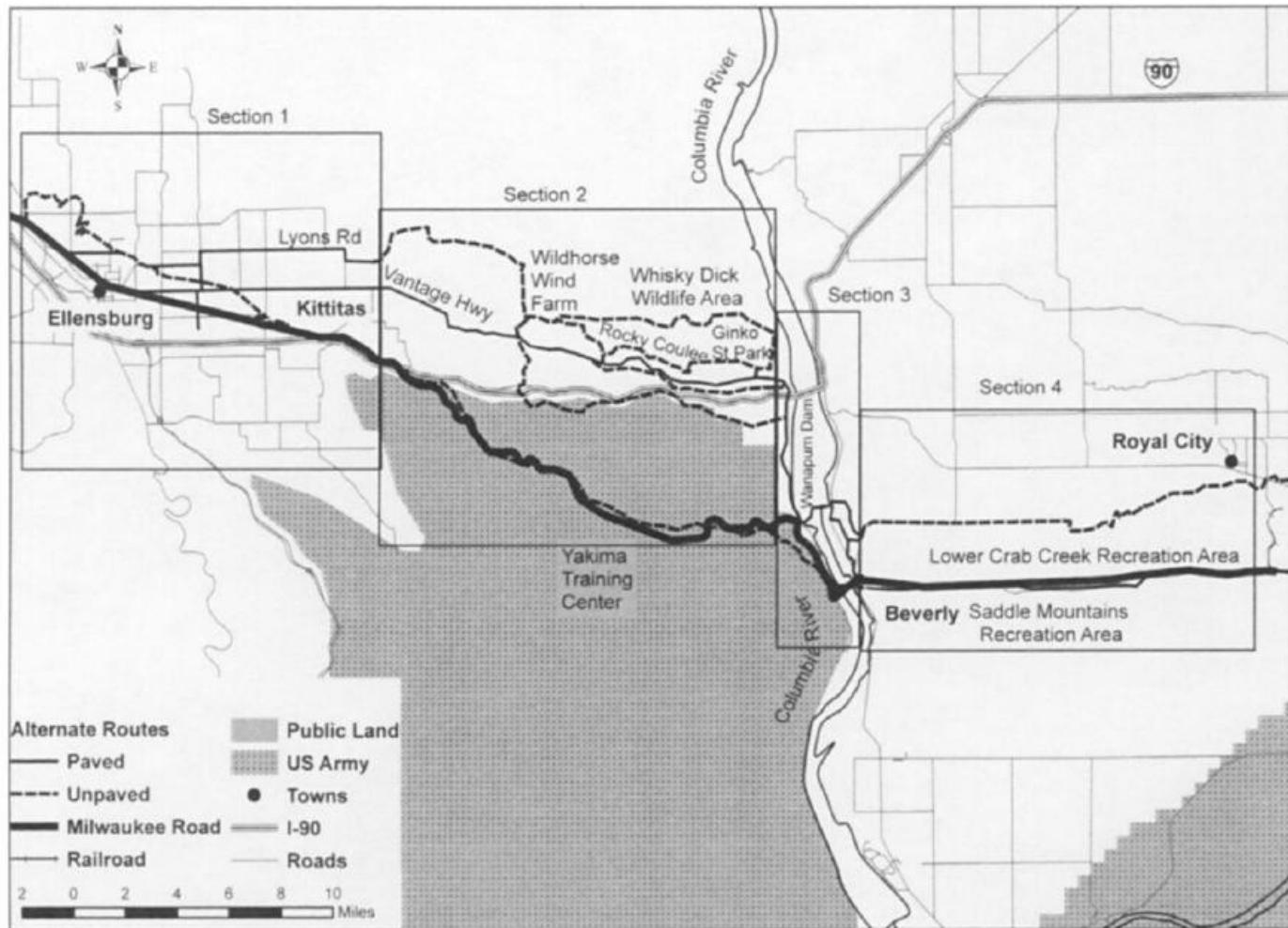
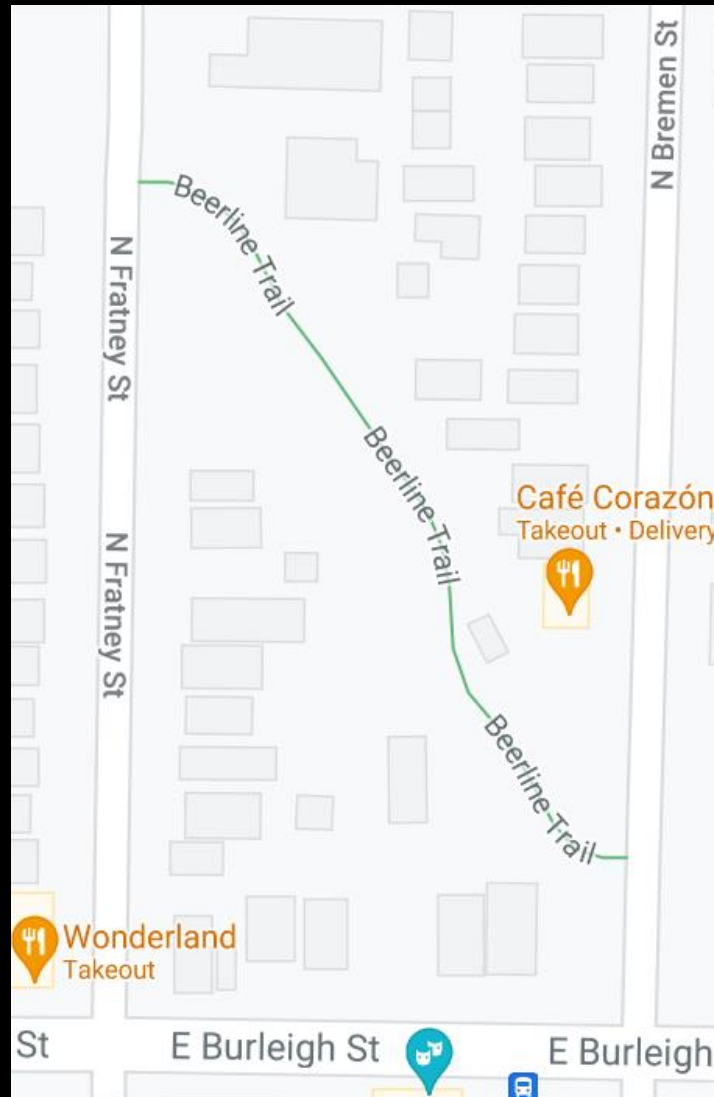


Figure 8. Alternate Routes – Western half of study area

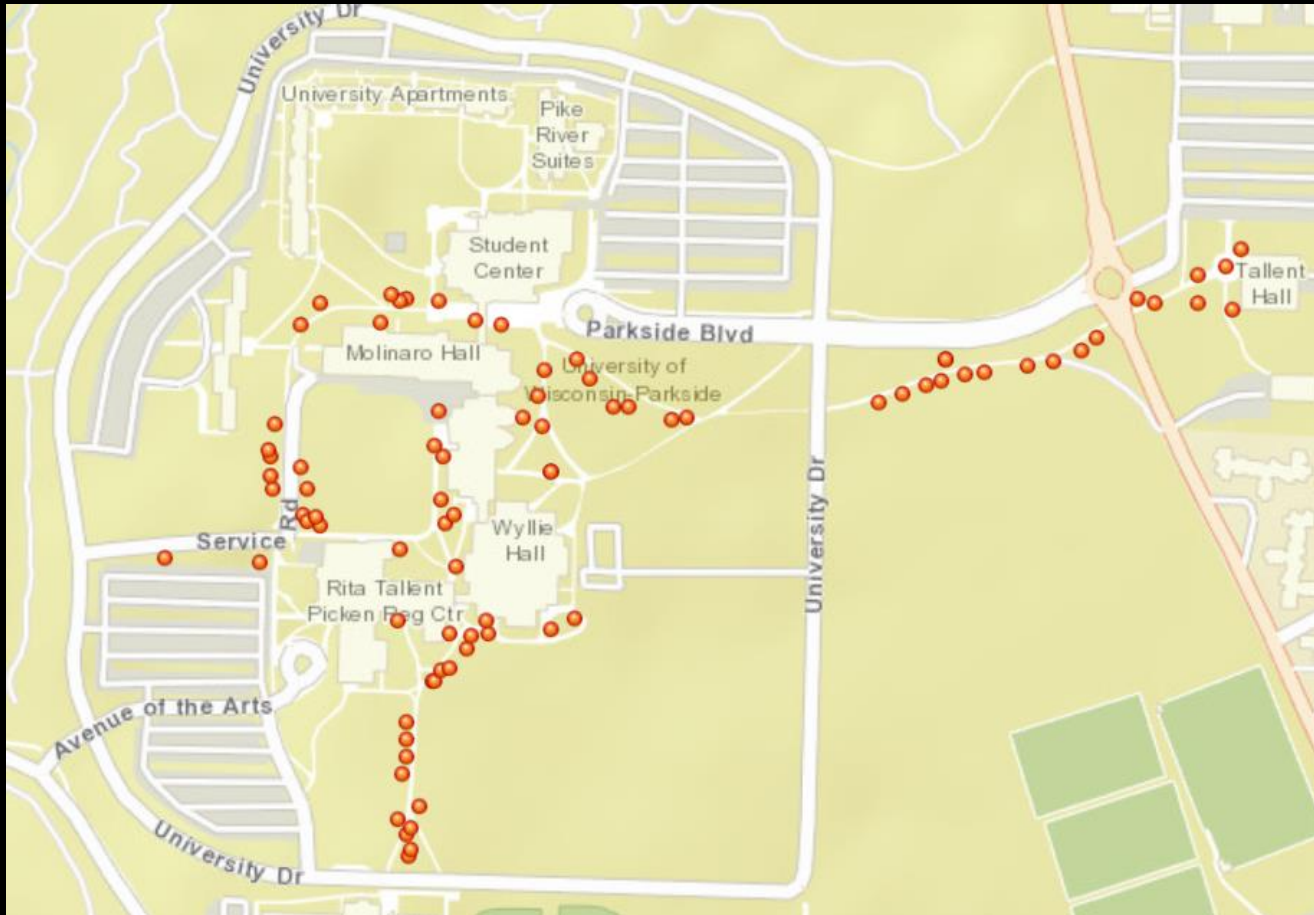
Ward, John V. and Nancy B. Hultquist. 2010. The John Wayne Pioneer Trail in Washington State: Rails-to-Trails to... Rails and Trails? *Material Culture: The Journal of the Pioneer America Society*. 42 (1): 25-46

Beerline Trail

(Milwaukee Road “Beerline” Spur Milwaukee, WI)



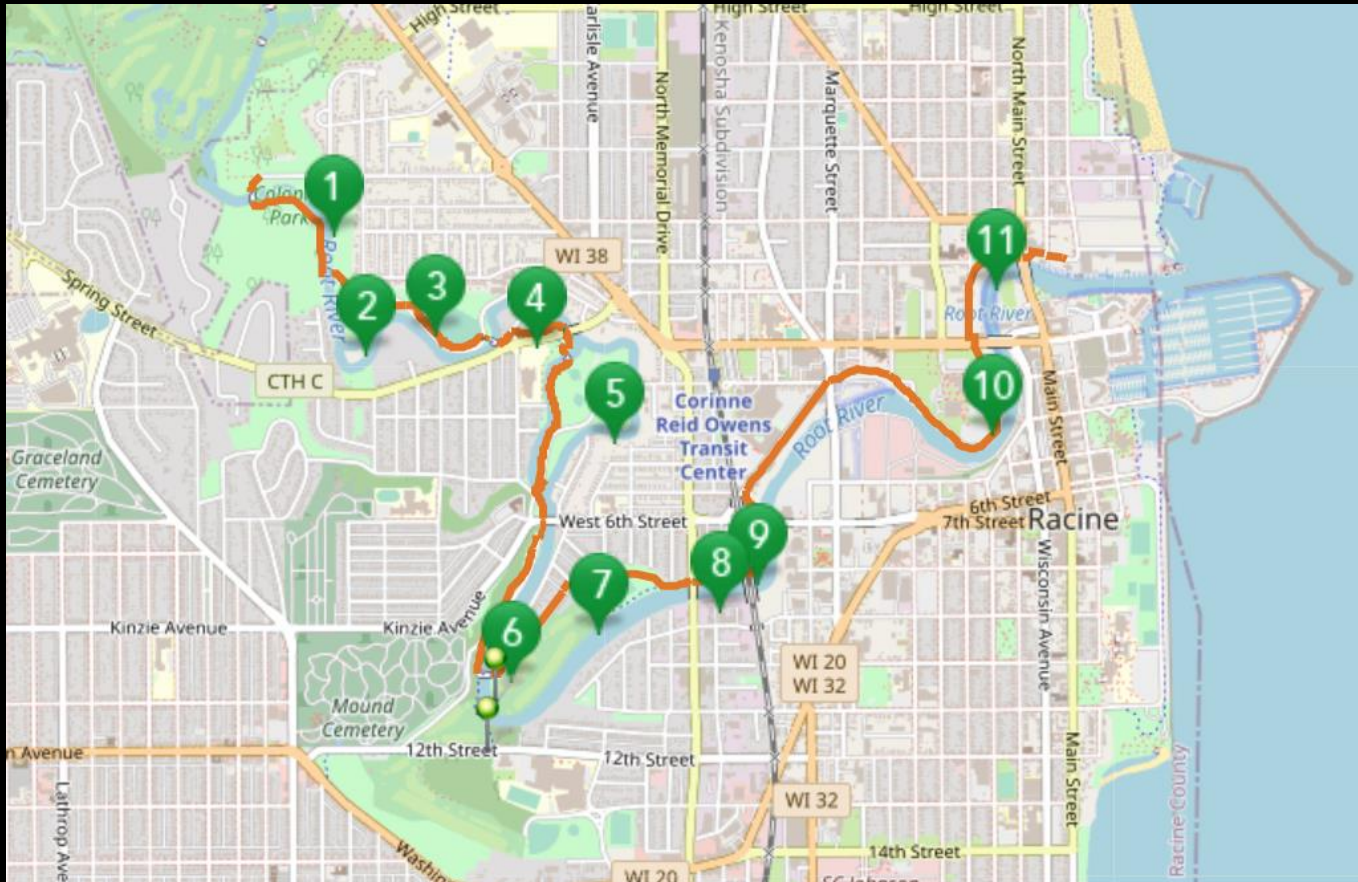
Anna Marie Williams Nature Trail (UW-Parkside)



<https://www.uwp.edu/learn/departments/biologicalsciences/amwtrailmap.cfm>

Racine Root River Pathway

(Root River Council)



<https://rootriver.weebly.com/>

<https://storymaps.arcgis.com/stories/ef7acea79a1a406686ce70ae6d53178e>

A Really Cool GIS Canal App

C&O Canal Explorer Mobile App



The C&O Canal Trust is proud to release a major update to its new C&O Canal Explorer app to help you explore all 184.5 miles of the C&O Canal National Historical Park! The update was released in August 2021.

The C&O Canal Explorer mobile app was released in 2017, and a major update was released in August 2021.

The mobile app features the following:

- 600 mapped and searchable points of interest
- Interaction with your device's GPS, so you can see how far you are from points of interest
- Driving directions and mileage between points
- Details about historic sites

The update features the following:

- Addition of mile markers
- Addition of 200 restaurants, hotels, and shops in ten Canal Towns
- **Itinerary builder** that allows you to create, save, and share your own C&O Canal adventure
- Ability to keep screen on (so it doesn't power off while riding)

Do you manage historic canal(s)?
Do you want to enhance recreation, tourism,
and education using GIS?

- Colleges and Universities can potentially help!

GIS at UW-Parkside

- GIS Certificate *(12 credits) **
- GIS Minor *(18 credits)**
 - **students must choose GIS Certificate OR GIS Minor*
- Spatial Data Analysis Lab (aka GIS Lab)
- GIS Factory

GIS Minor and GIS Certificate Classes

GIS Core Classes (9 credits)

- GEOG 350 Cartography and GIS
- GEOG 460 Intro to GIS Analysis
- GEOG 465 Advanced GIS



GIS Certificate (12 cr)

- Core Classes
- 1 elective (3 cr)

GIS Minor (18 cr)

- GEOG 100 Physical Geography or GEOG 105 Human Geography
- Core classes
- 2 electives (6 cr)

GIS Elective Classes

- GEOG 355 - Field Mapping
- GEOG 370 - GIS & Planning
- GEOG 410 - GIS & Communities
- GEOG 491 - Special Topics in GIS
 - GEOG 491 - Resource Conservation
- GEOG 494 - Internship
- GEOG 499 - Independent Study
- ANTH 300/491 - Archaeology Field School

GIS Student Opportunities

(beyond class lectures and lab exercises)

- GIS class projects (individual and/or group)
 - Community-Based Learning (CBL) projects
 - GIS use on projects in non-GIS classes
- GIS Internships
- GIS Independent Studies
- Collaboration on research with faculty
- GIS Factory



- Students provide GIS services to clients
 - Mapping, cartography, spatial analysis
- A consultant type of GIS service for clients
- Creates different work environment, expectations, and learning outcomes for students
- Students interact directly with clients and are involved in many aspects of projects
- Will help prepare students to transition into GIS workforce

UW-Parkside GIS Community Partners

(Some of the folks we have worked with)

City of Kenosha

Kenosha County

Kenosha Public Library

City of Racine

Racine County

City of Waukesha

Waukesha County

Village of Gurnee

Village of Pleasant Prairie

Root River Council

Pringle Nature Center

River Bend Nature Center

Greening Greater Racine

Eco-Justice Center

Racine River North

Brass Community School

Meadowbrook Country Club

US Naval Station Great Lakes

WE Energies

CNHi

General Mitchell International
Airport

Mt Rainier National Park

US Fish and Wildlife

UW-Parkside

My Research

PUBLICATIONS

- Ward, John V. 2013. The History and Geography of the Milwaukee Road in Eastern Washington. *Association of Pacific Coast Geographers Yearbook*, Vol. 75.
- Ward, John V. and Nancy B. Hultquist. 2010. The John Wayne Pioneer Trail in Washington State: Rails-to-Trails to... Rails and Trails? *Material Culture: The Journal of the Pioneer America Society*. 42 (1): 25-46
- Ward, John V. and Nancy B. Hultquist. 2009. The Milwaukee Road in Washington State: Rails to Trails... to Rails and Trails? (Abstract) *Pioneer America Society Transactions (PAST)* 32. Online: <http://www.pioneeramerica.org/>
- Ward, John V. 2004. The John Wayne Pioneer Trail: Alternate Routes Between Ellensburg and Lind, Washington. Master's Thesis, Central Washington University.

My Research

PRESENTATIONS

- Ward, John V. 2021. Geospatial Technologies and Historic Canals Today: Enhancing Education, Recreation, and Tourism for End Users with GIS. Paper presented at the World Canals Conference, Hagerstown, MD, USA.
- Hultquist, Nancy B. and Ward, John V. 2014. The History and Geography of the Milwaukee Road in Eastern Washington. Paper presented by co-author at the Association of Pacific Coast Geographers Annual Conference, Lake Tahoe, NV, USA.
- Hultquist, Nancy H. and John V. Ward. 2009. Milwaukee Road Today. Paper presented at the Association of Washington Geographers Meeting, Seattle, WA, USA.
- Ward, John V. and Nancy B. Hultquist 2009. Rails with Trails: A State Level Model for Rail Banking and Trail Preservation. Paper presented at the Association of American Geographers Meeting in Las Vegas, NV, USA.
- Hultquist, Nancy B. and John V. Ward. 2009. Contemporary Trail Use of the Milwaukee (Rail) Road in Washington State. Paper presented at the Association of American Geographers Meeting, Las Vegas, NV, USA.
- Ward, John V. and Nancy B. Hultquist. 2008. The Milwaukee Road in Washington State: Rails to Trails... to Rails and Trails? Paper presented at the Pioneer America Society Annual Meeting in Baton Rouge, LA, USA.
- Ward, John V. 2006. The Milwaukee Road in Washington State. Poster presented at the 2006 Association of American Geographers Annual Meeting, Chicago, IL, USA.

Thank You!

John Ward

Department of Geography and Anthropology

University of Wisconsin-Parkside

wardj@uwp.edu

+1 262-595-3327



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